

CLAIMS

1. A high-speed particle generating method which condenses a pulsed laser beam generated from a pulsed laser beam generator at a predetermined condensing point through an irradiation optical system, and irradiates the pulsed laser beam to a high-speed particle generating target that is set at the predetermined condensing point, thereby generating high-speed particles from the high-speed particle generating target, said method further comprising the steps of:

10 a first step of generating a reference light from the predetermined condensing point, measuring the wave front of the reference light by using a wave front measuring device, and storing the measured wave front as a reference wave front;

15 a second step of measuring the wave front of the pulsed laser beam generated from said pulsed laser beam generator and passing through the predetermined condensing point by using said wave front measuring device; and

20 a third step of compensating the wave front of the pulsed laser beam from said pulsed laser beam generator based on the reference wave front.

2. A high-speed particle generator comprising:

25 a target unit for holding at a predetermined position a high-speed particle generating target that generates high-speed particles when laser plasma is generated due to irradiation of a pulsed laser beam;

a pulsed laser beam generator for generating the pulsed laser beam;

a wave front compensating unit for compensating the wave front of said pulsed laser beam; and

5 an irradiation optical system for condensing at a predetermined condensing point the pulsed laser beam of which the wave front is compensated by said wave front compensating unit,

wherein said wave front compensating unit comprises:

10 a deformable optical system such that an optical operation unit of an optical element for reflecting or deflecting the pulsed laser beam is deformably constituted;

a reference light source for generating a reference light from the predetermined condensing point;

15 a wave front measuring device for measuring the wave front of the reference light and the wave front of the pulsed laser beam passing through said predetermined condensing point, respectively;

20 a storing unit for storing as a reference wave front the wave front of said reference light measured by said wave front measuring device;

25 a deformable optical system control unit for compensating the wave front of the pulsed laser beam in such a manner that said optical operation unit is deformed based on the wave front of the pulsed laser beam and the reference wave front measured by using said wave front

measuring device;

a displacement mechanism for displacing said reference light source so that the emission position of the reference light is conformed at the predetermined condensing point, or displacing said target unit so that the high-speed particle generating target is conformed with a plane including the predetermined condensing point.

5 3. A high-speed particle generator comprising:

a target unit for holding at a predetermined position a high-speed particle generating target that generates high-speed particles when laser plasma is generated due to 10 irradiation of a pulsed laser beam;

a pulsed laser beam generator for generating the pulsed laser beam;

15 a wave front compensating system for compensating the wave front of the pulsed laser beam; and

an irradiation optical system for condensing at a predetermined condensing point the pulsed laser beam of which the wave front is compensated by using said wave 20 front compensating system,

wherein said wave front compensating system comprises:

a deformable optical system such that an optical operation unit of an optical element for reflecting or deflecting the pulsed laser beam is deformably constituted;

25 a reference light generating unit having a pinhole for

generating a reference light from the predetermined condensing point by passing through the pulsed laser beam;

5 a wave front measuring device for measuring the respective wave fronts of the reference light and the pulsed laser beam passing through the predetermined condensing point, respectively;

10 a storing unit for storing as a reference wave front the wave front of the reference light measured by using said wave front measuring device;

15 a deformable optical system control unit for compensating the wave front of the pulsed laser beam in such a manner that said optical operation unit is deformed based on both of the wave front of the pulsed laser beam measured by using said wave front measuring device and the reference wave front;

20 a displacement mechanism for displacing said reference light generating unit and said target unit holding the high-speed particle generating target, respectively, on a plane including the predetermined condensing point.

25 4. A high-speed particle generating apparatus according to claim 3, wherein the high-speed particle generating target is formed on the surface of a membrane target member,

25 wherein an opening for passing through the pulsed laser beam and a pinhole are formed in said target member, and

wherein the wave front of the pulsed laser beam having passed through said opening is measured by using said wave front measuring device.